

**Partnership for Clean Indoor Air
Scale-Up Pilot Projects (#EPA-OAR-ORIA-07-03)**

Project Title:	Bolivian Scale up of Improved Rocket Stoves
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Project Period:	August 2007 to July 2009

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1. Project Summary

1a. Bolivia, one of the poorest and least developed of the Latin American countries, has an infant mortality rate of 66.7%, the highest in South America. Respiratory disease is a major cause for this condition. The WHO's *Atlas of Children's Health and the Environment* show that the percentage of Bolivian households consuming wood for fuel is between 51 to 75%. A recent document supplied by the GTZ in Bolivia states that approximately 80% of the rural population (1,160,000 families) use biomass for cooking. This represents 90% of the total energy consumed per family. Close to one million tons of wood are consumed each year in rural homes, while in the urban areas fully 20% depend on biomass fuels to cook. Few are aware that the smoke from these traditional cooking methods is, in many cases, the cause of various sicknesses.

CEDESOL is scaling up the production, marketing and distribution of a technology that has already been found to meet consumer needs and desires. By using a consumer accepted technology that has been determined to greatly reduce IAP and fuel consumption and a sustainable business model we will create a lasting situation that improves the health, livelihood and quality of life of a majority of the Bolivian population. Bolivia is unique in that it comprises within a small geographical area many of the different ecosystems in South America. As lessons are learned and techniques are optimized we will also be in a position to implement this technology into other South American countries.

An example of this possibility is evident from a recent interaction with the Uruguayan organization, Centro de Estudios Uruguayo de Tecnologías Apropriadas. as a result of

seeing CEDESOL demonstrate and discuss the stove at the recent International Seminar on clean stoves sponsored by GTZ (La Paz, March 6 - 8 2007), CEUTA has requested to be trained in the manufacture and use of the stove to disseminate in Uruguay as well as the CEDESOL participative dissemination model.

1b. This project will significantly increase the availability and use of affordable, reliable, clean, efficient and safe home cooking practices through the formalization and scaling up of an innovative delivery system, supported by consumer education and product awareness.

Through raising awareness of the dangers and solutions to IAP in 1,000,000 households, 20,000 Bolivian families will use clean and efficient technologies as a direct result of the EPA-funded project, reducing IAP and environmental degradation by April of 2009. Approximately 120,000 people will benefit directly, as devices are delivered countrywide through certified regional businesses and NGOs.

Although CEDESOL was chartered by the Bolivian government as a not for profit foundation in 2003, David Whitfield, co founder and Executive Director has been involved in improved stove technology since 1998. It was during those years an integrated cooking system utilizing solar, efficient biomass and retained heat cooking technologies was employed. From then until mid 2003 a metal rocket elbow was used in an effort to provide an inexpensive device. Beginning in 2003, CEDESOL took advantage of an ongoing relationship with the ETHOS program and with their help developed a thermal combustion chamber utilizing the "6 brick" method.

In 2005 GTZ PROAGRO Energía identified clean and efficient cooking devices in Bolivia as a priority area of focus. As an integrant to the GTZ effort, CEDESOL began with a pilot project of different types of efficient stoves, including solar and retained heat devices. Responding to demand, a new stove was developed based on the well-documented Rocket Stove. CEDESOL, a major participant in the GTZ stove initiative currently receives a subsidy of \$26 per stove, under a contract for 1,000 stoves. This subsidy reduces to \$15 in 2008 and then to zero in 2009. Demonstrations around the country resulted in formal requests by consumers for over 1,000 ecological stoves and an immediate projected demand for 20,000 in the entire survey area. The NGO, Project Concern International, purchased 1240 stoves for rural community schools. As stoves are being installed into schools, community members are demanding stoves for

household use. Other NGOs have begun requesting stoves to implement in their project areas. The demand is greater than the ability to supply.

The 2-burner rocket stove retails for around \$95.00 and several have been purchased at that price. However, by providing the stoves in participative workshops (of 30 or more participants), where the client assembles his own stove or solar cooker and provides the platform for the rocket stove (in most cases made from adobe), instead of the metal support structure, then the stove can be sold for \$56 less the current \$ 26 GTZ subsidy, resulting in a net consumer cost of \$30. Our expectations are that with industrialized production techniques we can further reduce the cost and that once the subsidy is eliminated the price per stove will be less then \$40. Even the poorest portion of the population can afford this amount as they begin to see it as a valued item as a result of our education and marketing campaigns.



Our innovative delivery system is 3 fold:

I. - Industrialized manufacturing to reduce costs, ensure product quality, and assure that standardization of pieces will be implemented.

Currently the principal stove manufacturer has 3 separate physical production areas, including the main stove parts workshop, which they supervise. Most of the parts fabrication and some assembly is currently done in El Abra. In the Valley Hermosa shop, the rest of the metal work is completed, stoves and accessories are entered into inventory, metal-working materials and supplies are delivered there and then shipped out to El Abra in quantities sufficient for 100 stoves at a time, each time stoves are picked up. In the third location is their office and solar cooker assembly area.

The SWOT analysis demonstrated the advantage of combining the last 2 workshops into one facility large enough to separate the operations and achieve centralized warehousing, facilitating one inventory control for both materials, product in and product out, as well as provide for a central manufacturing facility where all of the cutting and piercing will be accomplished with the CNC Plasma Cutter system. This will provide better overall accountability while reducing management, transportation and operational costs.

Once the stove is analyzed in Aprovecho lab, modified for efficiency, and the fabrication procedures modified for process efficiency, it will be necessary to design and build the folding and bending devices and jigs so that the pre cut and pierced parts are turned into stove pieces that can be quality controlled. The work force in El Abra will be retrained to operate this machinery, complete the required tasks and all of the welding and fitting will be done there.

When the stove's parts process production becomes polished en El Abra, we

will be in a position to expand into other areas using the same system. As outside production catches up to the cutting and piercing operation in the central manufacturing plant, other shifts will be added within the same infrastructure. Again, there are operational cost advantages as opposed to reproducing this facility in other areas.

II. - Stoves are initially disseminated through hands on workshops that include assembly, use and maintenance.

Personnel in existing NGOs are trained to do the workshops. NGO personnel will be trained to implement the stove installations, provided in “kit” form. Regional small businesses will be developed to assemble devices as training workshops create an understanding of the use and the maintenance of the technology. Awareness campaigns will be established in print, radio and TV, incorporating the Andean version of the PBE system. Implementation will be evaluated through periodic evaluations. CEDESOL has established that technology transfer is a key to long-term adaptability and is essential both in immediate implementation and expansion. Municipal governments have also entered into agreements for the provision of “kits” and training for local small business operators, so that the expansion stage will closely involve local participation in technology transfer.

III. - Financing beyond initial subsidies will result from negotiated Voluntary Market emissions reduction certificates within the Clean Development Mechanism (CDM).

-A diminishing subsidy per stove (funded by GTZ and scheduled to end in 2009) has given this stove immediate market penetration. As stated earlier the price of the stove will lower as production is streamlined to compensate for the diminishing subsidy. Along with this diminishing subsidy program CEDESOL is working to set up other mechanism of financial support in purchasing the stoves. Avenues that will be followed to provide long-term sustainability beyond initial subsidies include but are not limited to negotiated Voluntary Market emissions reduction certificates within the Clean Development Mechanism (CDM) and Micro-Credit systems (currently a project with Climate Care financing is being developed). This future financing will permit greater dissemination

because the stove will be affordable for those traditionally excluded (earning \$1 to 2 per day), in a model that incorporates participative commitments by communities for sustainable management of forestry resources, as well as financial and participative counter parts, and will permit market driven choices.

2. Project Goals, Outputs and Outcomes

2a. CEDESOL has been building a rocket stove in Bolivia for the past 9 years and has determined that there is a significant demand for scaled-up production. Under contract with a local energy products company, CEDESOL will buy down the risk of the initial manufacturing runs by committing to provide the materials for 2,000 units to ramp up the manufacturer's fabricating ability. This will occur in two stages, to be implemented according to our September 07 and February 08 activities.

Our goal is multiple: first we want to absorb the unknown initial manufacturing errors, retraining the EL Abra team and training the centralized manufacturing team. We are essentially covering the cost of the materials for these units. Second we will have a stock of stoves to use for fuel and stove efficiency studies, as well as a stock of stoves to use to train other NGO personnel etc. It is not our policy however to give stoves away.

Stove sales income does not cover the costs of training, formation, investigation, or technology transference. Although we do not anticipate substantial income generation from these test runs, funds generated through these stoves will be plowed back into the project in the categories of materials, commercialization, awareness raising and training, and reported as such.

Keeping in mind that this project is a scale up to achieve the implementation of 20,000 stoves by July 2009, and thus help realize industry sustainability, while raising awareness of IAP and interventions. We believe this is a practical way to reduce risk and acquire the specific knowledge and use documentation needed.

Processes and techniques to improve decision-making and the quality of decisions are well known. Using both the USP analysis and the PEST analysis it was determined that we could achieve market advantages and strategic positioning at this stage of market and IAP problem awareness by going into the rural areas, demonstrating the stoves to groups who have invited us into their community, provide a platform for them to auto-identify the IAP consequences and raise awareness of interventions.

We call these “stove groups”. Once stoves are demonstrated, and the “clients” manifest their desire for the intervention, subsequent training and stove deliveries are made in sufficient quantities to generate further interest by residents who did not participate in the first opportunity, after that possibilities open for local distribution. At that time, other organizations are identified who may find it desirable to begin participating in the stove dissemination program. They then become part of the distribution strategy.

CEDESOL will work with Aprovecho Research Center (ARC) in this endeavor. ARC has had over 30 years experience designing, testing, and implementing projects of household stoves. Presently they are working in partnership in over 20 countries in this capacity. A major component of these partnerships pertain to scaling up production to make fuel and health saving stoves an option for a greater percentage of the world’s population that cooks on biomass. One example of this would be Aprovecho’s project in India where they are committed to setting up the infrastructure to sell 1,000,000 stoves. It is expected that this will be the first of many needed million-stove projects around the world. Goals for the Bolivian project will be closely related to what ARC have found to work in these other efforts.

A detailed list and timeline of the steps would be as follows:

- 1-Send rocket stove to ARC lab for verification - June 2007 CEDESOL
- 3-Test stove at ARC - July 2007 ARC
- 2-Start selection process for most promising production site July 2007 CEDESOL

Project officially starts approximately August 15, 2007

- 4-Create a material list for scaling up production facilities - Aug 2007 CEDESOL
- 5-Purchase equipment to be brought from USA - Aug 2007 CEDESOL and ARC
- 6-Initial scale up of first production site - September 2007 ARC and CEDESOL
- 7-Educational and Market Penetration - Oct-Dec 2007 CEDESOL
- 8-Technical Support from ARC - Oct-Dec 2007 ARC
- 9-Evaluate initial scale up - Dec CEDESOL
- 10-Repeat steps 2,3 and 5 for larger number of production facilities, distribution centers or organizations - January 2008
- 11-Set up of larger number of production facilities - February 2008 ARC and CEDESOL
- 12-Field Testing of stoves (CCT) - February 2008 ARC and independent organizations
- 13-Further educational and market penetration - March-July 2008 CEDESOL
- 14-Technical Support from ARC - March-July 2008 ARC
- 15-Evaluate Secondary scale up - August 2008 CEDESOL
- 16-Repeat step 10 for larger number of production facilities - September 2008
- 17-Repeat steps 11, 13, and 14 - October - December 2008
- 18-Evaluate complete scaling up - January, 2009 ARC and CEDESOL
- 19-Field Testing of stoves (KPT) -February 2009 ARC and independent organizations -
- 20-**Complete report of work - July 2009 CEDESOL**

2b. - This project will result in increased adoption and sustained use of clean, efficient and affordable cooking technologies that reduce indoor air pollution. There are a number of **project outputs** that will assure us that this is so. A list of those outputs and how they will be verified follows:

<u>OUTPUT</u>	<u>ACTIVITY</u>	<u>INDICATOR</u>
20,000 integrated cooking systems installed.	<p>The business plan is one that is both sustainable and brings with it a large amount of social benefit. We will be creating a centralized production center that will maintain product quality, coupled with a sustainable distribution system involving social marketing and community participation.</p> <p>A market driven approach will be utilized, bolstered by other financial mechanism at our disposal, as described above.</p>	Number of integrated cooking systems installed documented through database.
Sustainability beyond funding period	<p>In addition to increasing manufacturing ability and assuring quality control, local entrepreneurs will be trained to put together and sell the stoves. One example of this is where we are using a rehabilitation workshop to produce pieces of stoves and solar cookers in the carpentry and metal working shops of EL Abra prison. (The Bolivian Government does not have rehabilitation programs. Currently over 30 inmates are providing incomes for their families and one individual has been put on "work release" and will be working for CEDESOL.)</p>	<p>Number of stoves produced.</p> <p>Number of assembly sites, small businesses in communities and NGO's actively introducing stoves in their area of influence.</p>
Awareness raised through PBE System	<p>Esther Balboa (PhD), ex Vice Minister of Education for Bolivia and past Human Resources Director for Cochabamba, Bolivia's 3rd largest city, will head up the project's public awareness campaign adapting the HELPS/EPA Placed Based Education system to Bolivia's Aymara, Quechua and mestizo cultures.</p> <p>The PBE program CEDESOL develops will be implemented countrywide by GTZ as a component of their 100,000 smoke free homes initiative. The GTZ initiative is focused on developing consumer awareness of the dangers of IAP, causes and possible solutions. The second important factor of this initiative is the development of partnerships with the national government, NGO's, and private businesses as participants of the campaign. Already the Energy Ministry and Health Ministry are committed</p>	<p>Andean Culture Placed Based Education System.</p> <p>Number of radio and TV spots.</p> <p>Number of IAP awareness posters.</p> <p>Number of Municipal governments incorporating IAP awareness.</p>

Document lessons learned	Document the experiences, pros/cons, realities and problems encountered with developing small businesses, supply chain, experiences in distribution; construction and use manuals	Various PDF documents published
Data-base and documentation of fuel use	Working with Universities and GTZ we will perform a survey of the stoves at the beginning and the end of the scale up project to evaluate the socio and economic benefits of the project	Synopsis of Data base statistics in English
IAP and Fuel Consumption Reduced	As described below ARC and CEDESOL will verify the fuel and IAP saving aspect of the stove in three stages, first in a controlled lab situation using the Water Boiling Test (WBT), second in a Controlled Cooking Test (CCT) done in the field, and finally in performing a Kitchen Performance Test (KPT) also in the field. We will also be working with the University of Bolivia, GTZ and CINER, to verify the results of the stove tests	Determined by results of fuel tests, WBT, CCT, KCT, IAP measurements, particles and CO

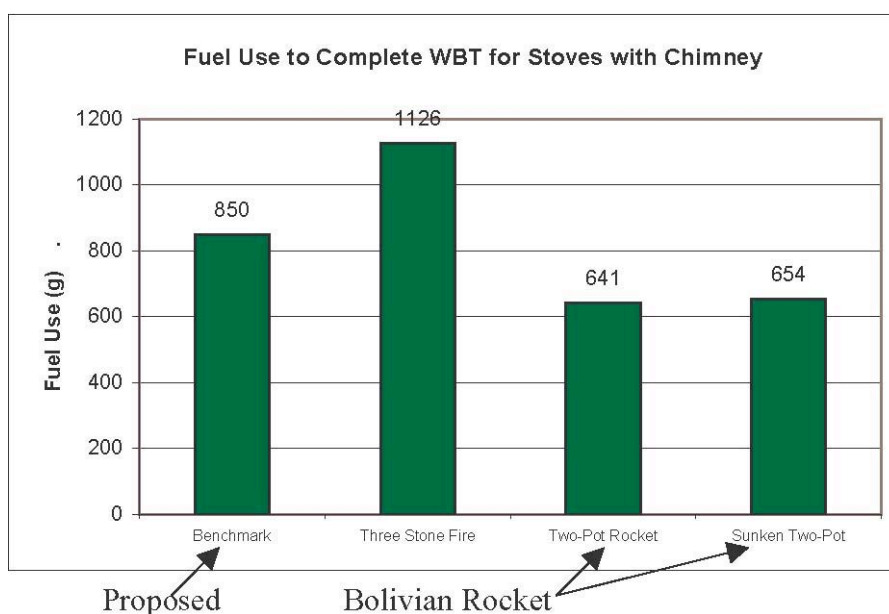
2c. Traditional cooking practices consume the equivalent of 2 kilos of biomass per person per day. This is expected to be reduced by 50% or more; therefore fuel costs will be reduced similarly. Environmental impact related to deforestation will be reduced. Over 90% of current indoor air pollution will be reduced, significantly reducing current and future health impacts.

Communities will be strengthened by involvement in the participatory workshops and their capacity to make better decisions affecting their lives will be improved.

The scaling up process will go through two stages. With the present production system there is a capacity for the creation of 300 to 400 stoves a month, but problems with cash flow and distribution have caused many stops and starts. In the first stage of scale up this number will be marginally increased to 600 stoves a month as industrial production techniques and the stove design are fine-tuned and the improved distribution system is put into place. The second stage will ramp production up to 1,200 stoves per month by August 2008. The final ramping up will bring total monthly production to 2,000 stoves per month by July 2009. By the end of the two-year scaling up process this project will directly impact approximately 120,000 people, with the expectation of there being a sustainable system in place to continue the dissemination of this number of stoves monthly.

3. Description of activities, methods and materials to be developed and utilized in achieving goals.

3a. The scale up in Bolivia will primarily involve the dissemination of a double burner rocket stove with a chimney. This technology is one that has been tested extensively for fuel and IAP performance in many projects and has had great user acceptance in Bolivia. The following are results for performance in WBTs as compared to a traditional three stone fire. The comparisons are for fuel use and Particulate Matter (PM) and Carbon Monoxide (CO) produced in bringing 5 liters of water to a boil and then simmering for 45 minutes.



Fuel Consumption:
Findings from the ARC lab indicate that stoves similar to the Bolivian design use close to 50% of the fuel as compared to the three stone fire.

Emissions: There are two ways we wish to look at a stove when it comes to its emissions: 1.- How much IAP is being released into the kitchen and, 2.- How much pollution is going into the environment around the kitchen. For both of these evaluations we look at CO and PM produced.

From the EPA produced book Comparing Stoves we find the following comparison between the two-pot rocket (the type of stove being produced by

CEDESOL) and the traditional three stone fire:

CO - The two-pot rocket with a chimney brought the test kitchen to a concentration of 9.7ppm while the three stone fire brought the test kitchen to a concentration of 394ppm, a 97.5% reduction. This represents the difference we would expect to see in the user's kitchen. The collection hood found that the two-pot rocket emitted 13.03 grams of CO while the three stone fire emitted 26.5 grams, about a 50% reduction. This represents the difference we would find emitted into the outdoor air.

PM - The two pot rocket with a chimney brought the test kitchen to a concentration of 479 micrograms per square meter while the three stone fire brought the test kitchen to a concentration of 14,972 micrograms per square meter, a 97% reduction. The collection hood found that the two-pot rocket emitted 662 mg PM while the three stone fire emitted 1793 mg, a 63% reduction.

From this we see that from the cooks standpoint there is almost a 50% reduction in fuel consumption and almost a total elimination of IAP. Even then looking at the less harmful emissions into the outdoor air we find the potential in reduction to be greater than 50%.

While the main focus in the scale up will be with producing the two-pot rocket stove, CEDESOL will be introducing an integrated cooking system. This means that along with the fuel and IAP saving rocket stove, which has proven to create consumer demand, CEDESOL will also introduce the supplementary use of both a retained heat cooker and a solar cooker. From work CEDESOL has done with this integrated cooking system, it has found that an average fuel reduction of 85% occurs when all three technologies are employed. During the hands on workshops, participants learn to make effective, durable retained heat cookers from household materials. This is usually a prerequisite to participate in the workshops.



3b. Most Bolivians are currently ignorant of the cause and negative health and environmental effects of indoor air pollution and inefficient combustion. An integral part of our project will be an education and media campaign to increase this awareness. From the initial survey work that both CEDESOL and GTZ have done in communities, there will be a demand for the stove that should easily keep ahead of the projected levels of production.

3c. CEDESOL is presently filling sales orders of 2,500 stoves, but have a current production capacity of 300 to 400 stoves a month. The demand is increasing as stoves are installed in schools. We project a need to produce 2,000 stoves a month by 2009 in order to satisfy the demand. Our current distribution method will evolve and expand to include providing training and stoves to NGOs and small rural businesses.

3d. Quality control will be achieved on the first level through a centralized production facility for the majority of the pieces to be assembled in other locations. Proper assembly is easily achieved by location of screw holes and tabs, etc. Emphasis on consumer training will help customers know how to use and maintain the stoves. Training of NGO technicians will assure quality control in the field. Spot checks will verify performance.

ARC brings to this project the experience it has gained over the past 10 years in testing and maintaining the quality of stoves in its various project. Via their testing, technical support and consultation on past experiences, we expect ARC to help CEDESOL to be able to ensure a high level of quality.

3e. As mentioned above, Esther Balboa (PhD), ex Vice Minister of Education for Bolivia and past Human Resources Director for Cochabamba, Bolivia's 3rd largest the city, will head up the project's public awareness campaign adapting the HELPS/EPA Placed Based Education system to Bolivia's Aymara, Quechua and mestizo cultures. A combination of literature and Media campaigns will be used to promote and market the technology in a culturally appropriate manner.

One example of this printed material follows:



3f. As sited in the time table CEDESOL will perform both Controlled Cooking Tests and a Kitchen Performance Test where fuel use and IAP affect of the stove will be determined

4. Environmental Results and Anticipated Outcomes and Outputs.

a. We will track our success in achieving the desired environmental outcome in three stages. First we will verify the IAP and Fuel consumption potential of the improved stove in a controlled lab situation at Aprovecho Research Center. Secondly we will test the stoves in the field using local cooks and the CCT. Finally we will perform a KPT to further verify the in field fuel use and IAP production of the stove. Along with carefully tracked accounting of the number of stoves produced we will be able to verify the true

environmental results of this project. We will also include third parties such as GTZ and the University of Bolivia to verify results.

b. The significant project indicators, as listed in the timeline will be as follows:

1 -Testing of stove at ARC funding starts August 2007)	- July 2007	(EPA
2 -Evaluate initial scaleup	- Dec 2007	
3 -Field Testing of stoves (CCT)	- February 2008	
4 -Evaluate Secondary scale up	- August 2008	
5 -Evaluate complete scaling up	- January, 2009	
6 -Field Testing of stoves (KPT)	-February 2009	
7- Final report	- July 2009.	

5. - Past Performance

While CEDESOL will be the official organization applying for the grant, Aprovecho Research center will partnering with CEDESOL to see the project through to its desired conclusion. To that end ARC's history with past performances should have influence and reflection upon this project. The following is a list of federally funded assistance agreements performed by ARC:

(i) ARC successfully completed and managed the trainings and lab tests required under this project as directed by the EPA Project Officer. (ii) All reporting requirements were completed within two weeks of completion of the required tasks, including the submission of acceptable final technical reports. (iii) Under this contract, all technical aspects of the trainings and in-field testing was organized by ARC consultants.

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Pennsylvania Avenue NW Washington DC 20460

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Over the course of the last year, ARC has provided technical consulting services for the

Shell Foundation's Breathing Space project in India. It is the goal of the partners involved to manufacture and distribute 1,000,000 improved wood burning cook stoves. The scope of ARC's role includes overseeing prototype development and factory scale up prior to product roll out.

ARC has also provided technical assistance for the EPA funded scale up of fuel-efficient and IAP reducing stoves in Honduras. Through the NGO Trees Water and People, one of ARC's longest-term partners there has been over 15,000 stoves produced and distributed in Central America.

ARC has worked with many universities and institutional labs to greatly expand the worldwide knowledge base and technical capacity of this field. The ARC staff have made significant contributions to growing concerns related to indoor air pollution from household energy use. Having university research partners available to help monitor and assess product and data quality, contribute to training materials, quantify our testing, and qualify research findings is invaluable to ARC in both developing and implementing project plans and maintaining a quality assurance program.

ARC consultants have been involved in over one hundred fifty projects in more than sixty countries around the world. As a result, over 200,000 improved biomass cooking and heating stoves have been implemented through work with various governmental and non-governmental organizations.

6. - Detailed Itemized Budget

Budget Summary	
Personnel (Consultant and infield staff)	59,048.00
Fringe benefits	8,052.00
Contractual costs	0
Travel (Consultancy travel and in country travel expenses)	19,815.00
	89,999.00
Equipment (design and fabrication of machinery, plasma cutter, dies, and other items related to industrialization, and major stove components needed to initially fabricate product for scale up)	
Supplies (office, training materials, manuals, marketing materials, demonstrations)	6,200.00
Other (local labor, in field trainers and work shops, ARC lab fees)	14,886.00
Total direct costs	198,000
Total indirect costs	0
TOTAL COSTS	\$US 198,000

ITEMIZED BUDGET

Personnel (Consultant and in-country staff)			<u>59,048.00</u>
Mike Hatfield	Principal technology transfer ARC	30,000.00	
Sandra Moen	Administrative Liaison ARC	1,000.00	
David Whitfield	Project/Production Director	18,000.00	
Esther Balboa	Educational Director	6,000.00	
See Wan Lee	Project manager	8,500.00	
Ximena Luizaga	Administrative coordination	3,600.00	
Fringe benefits			<u>8,052.00</u>
Contractual costs			0
Travel			
(Consultancy travel and in country travel expenses)			<u>19,815.00</u>
International Travel			<u>9,100.00</u>
USA to Bolivia	MH/3 x 1,500.00	4,500.00	
Bolivia to USA	DW/2 x 1,500.00	3,000.00	
Per diem	DW/800 x 2	1,600.00	
In Country Travel			<u>10,715.00</u>
Travel costs		8,650.00	
Per diem	6\$ day	2,065.00	
Equipment			<u>89,999.00</u>

(and other items related to industrialization)

Production Equipment		38,150.00
1	Computerized Numerically Controlled Plasma Cutter system	with consumables replacement parts, shipping from USA to Bolivia, taxes and customs fees 14,000.00
1	Small computer and protective cabinet enclosure	To use with Plasma system, purchased in Bolivia 1,000.00
2	Welding Machines	Industrial @ 2,550.00 5,100.00
6	Bending and brakes	Custom fabricated machines to produce specific folds and bends 6,100.00
6	Workstations	Custom built for specific separated tasks 3,000.00
1	Large air compressor	With hoses, fittings and accessories 800.00
	Miscellaneous hand tools	Pliers, aviator snips, vise grips, bench vises, hack saws, saw blades, drill bits, riveters, tin snips, screw drives, bench grinders, etc. 2,300.00
2	Metal "cutoff" saws	Electric, to cut bars and angle iron 650.00
4	Portable grinders	Grinders with replacement disks 700.00
	Safety equipment	Industrial – gloves, eye shields, face shields, protective clothing for welding, ear protectors, etc. 2,500.00
1	Serial number maker	Machine to press out serial number /ID plates 2,000.00
Field Equipment		7,600.00
	Testing equipment for IAP (Aprovecho kit) and stove efficiency	PEM, CO monitor, others, etc 6,000.00
2	GPS	Hand held units to determine coordinates of stove workshops and installation sites in-countryside 350.00
	Photographic equipment	Document trainings, stove deliveries, user installations, and publicity 750.00
	Demonstration equipment	Dishes, pans, transport cases, cooking utensils, sleepings, etc. 500.00
Administrative Equipment		4,249.00
1	Computer	Desktop CPU to hold data base, data analysis and do transcriptions 1,500.00
1	Lap Top Computer	Portable to take into field for workshops and demonstrations 1,500.00
1	Data display	For projections in trainings and workshops 749.00
1	Laser Printer	Printer for producing documents, schedules, manuals, marketing and educational material, etc. Hewlett-Packard Officejet Pro Network-Ready Multifunction Printer 500.00
Initial stove equipment		40,000.00
Major stove components		Ramp up manufacturing

1st	Scale up	1000 units	20,000.00
2nd	Scale up	1000 units	20,000.00
<u>Supplies</u>			<u>6,200.00</u>
	Training materials	Rotofolios, training guides	1,300.00
	Marketing materials	Stove use and maintenance Manuals	1,900.00
<u>Office Supplies</u>			<u>3,000.00</u>
	General	Paper, photocopies, ink cartridges, folders, CDs, binding, printing survey forms, etc. postage, courier	3,000.00
<u>Other</u>			<u>14,886.00</u>
		(Local labor, in field trainers and work shops)	
	Stove trainers		4,700.00
	Coordinators		2,245.00
	ARC Lab Fees		3,000.00
	Publications	IAP Awareness Posters, brochures, PB learning activities	2,591.00
	Training	Testing training to UMSS	350.00
	Stove Workshops	To NGO's and PYMEs	1,000.00
	Awareness Workshops	NGO's, Gov.	1,000.00
Total direct costs			198,000
Total indirect costs			0
<u>TOTAL COSTS</u>			<u>198,000</u>

7. - Budget narrative:

PERSONNEL:

Mike Hatfield: Principal technology transfer and project liaison with Aprovecho Institute and their scale up processes around the work. He will be in Bolivia for at least 3 trips, during which time, besides the production details we will do 2 training workshops (1 with UMSS testing dept. and 1 with potential stove promoters) The expenses for Mike are spread out over the whole time frame of the project.

Sandra Moen: Administrative and accounting liaison, to insure the project is set up and running according to the best accounting and tracking procedures

David Whitfield: Chief responsible person to the project. His activities and responsibilities are spread evenly throughout the project. He will be responsible for reporting and for evaluations, as well as insuring the project keeps on schedule, troubleshooting as required.

Esther Balboa: Education Director will be responsible for elaborating our "Placed Based" Learning system and combining the features with our marketing strategy.

See Wan Lee: Certified Public Accountant and Administrator. See Wan speaks English, Spanish and Chinese. She will head up the daily project accounting and administrative responsibilities.

Ximena Luizaga is an administrative assistant, coordinating with the Project Director, Education Director and project Manager. She is responsible for office communications and public relations. She speaks Spanish and Quechua.

TRAVEL:

International: 5 Trips are planned including per diem

In Country: In country travel is for demonstrations, relations with municipal governments, trainings, stove dissemination, testing, monitoring and evaluation.

EQUIPMENT:

Production Equipment are the items needed to scale up production. Some equipment is added in later stages of increased production, such as brakes, welders, hand tools and safety equipment.

Field Equipment is comprised of the items needed to perform the field work, tests, IAP measurements and document the field work and achievements.

Administrative Equipment are the items directly related to producing the basic information, data bases of information and digital media, data analysis, transcription, reporting, exploratory research and evaluations.

Major stove components are the estimated quantities of materials to produce a minimum number of stoves to verify the production and delivery procedures as well as buy down the risk of the initial manufacturing runs by committing to purchase 2,000 units (at below wholesale prices) to ramp up the manufacturers fabricating ability. This item is divided into 2 units, one to implemented in Aug/Sept and the other to coincide with the Feb 2008 scale up and evaluation of the first scale up.

SUPPLIES:

Training materials and manuals will be used as marketing and distribution tools.

Office Supplies are those items necessary to document and report on the project, progress, problems, solutions, and maintain communication between stakeholders.

OTHER:

Covers local trainers, coordinators, lab fees (ARC fees related to use of their lab during the 2 year project period), publications, banners, brochures and 4 in-country workshops related to Awareness building, recruiting NGO's and others for stove promoters etc.

FURTHER DETAILS -

A breakdown of Mike Hatfield's time and experience follows:

700 hours in Bolivia – during 70 to 75 days in Bolivia

300 hours in USA (of which 70 are directly related to stove analysis and design modifications in the USA)

- Mike Hatfield has worked closely with numerous projects over the past 10 years in stove design, testing, and production. A short list of some of the most recent projects he has worked on is as follows:

2003 to Present: Worked on the initial scale up efforts of Trees Water and People (TWP) in Honduras. Initial scale up consisted in working with design, marketing, and all production aspects of the Eco Fagon, but mostly concentrating on scale up of metal bodies and insulated combustion chamber production as well as durability testing of materials. Since that initial scale up effort Mike has stayed in close contact with TWP and the various experts they have consulted with and will bring that experience to this project.

November 2005 to Present – Consultancy and evaluation of Appropriate Rural Technology Institute (ARTI) and Development Alternatives (DA) stove scale up in India.

November 2006 to Present– Technical consultant to Sun Energy in the scale up of improved Injira cooking stoves in Tigray Ethiopia.

March 2006 to Present – Technical consultant to Aprovecho Research Center's pilot project for scale up in Pondicherry, India.

In all of these projects Mike Hatfield worked with all the processes of stove production scale up, including but not limited to:

- Performing stove focus groups (stove focus groups are work sessions with local cooks and or stove producers to determine the potential acceptability/producibility of the stove)
- Working with marketing specialist
- Working with industrial design teams from industry and university settings
- Testing stoves using three most commonly used tests and latest lab equipment
- Interacting with manufactures of various stove parts

Sandra Moen's services are as follows:

ACTIVITY Sandra Moen	Fixed fees in \$ US	UNITS	Total \$US	TIME Budgeted
Project Accounting and start up Collaboration, CEDESOL staff training	0		0	Aprox. 2 days during each trip by David Whifield to the USA in July 2007 and January 2008
ARC Administrative Liaison	50	20	1,000	Monthly for 20 months
Revision of financial reports	0		0	When submitted by CEDESOL, according to the schedule developed by EPA
TOTALS Sandra Moen			\$US 1,000	

Bolivian personnel details:

Bolivian-base staff Responsibilities	in \$ US	UNITS (Months)	Total \$US	In Bolivia salaries are based on months
Project Director	750	24	18,000	75% of David Whitfield's time will be spent on this project
Project Administrative Manager	354	24	8,500	70% of this position will be dedicated to the project
Educational Director	600	10	6,000	60 % of this position during 10 months
Administrative Coordinator	150	24	3,600	80% of this staff person will be dedicated to the project Costs reflect actual amounts billed to the project of each staff position's time. When other staff members or volunteers provide service to the project, the costs will be absorbed by CEDESOL
Totals			36,100	